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Research Contribution 235

Navy Recruiting in an All-Volunteer Environment

Institute of Naval Studies

02 023500.00

DOCUMENT CONTROL DATA - R & D

Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified

1. ORIGINATING ACTIVITY (Corporate author)	2a. REPORT SECURITY CLASSIFICATION
Center for Naval Analyses	Unclassified
	2b. GROUP

3. REPORT TITLE

Navy Recruiting in an All-Volunteer Environment

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5. AUTHOR(S) (First name, middle initial, last name)

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6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1973	32	8

8a. CONTRACT OR GRANT NO	9a. ORIGINATOR'S REPORT NUMBER(S)
N00014-68-A-0091	CRC 235
b. PROJECT NO	
	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	

10. DISTRIBUTION STATEMENT

Approved for public release; distribution unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	Office of Naval Research Department of the Navy Washington, D.C. 20350

13. ABSTRACT

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14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
enlisted personnel						
Naval personnel						
Navy						
personnel selection						
procurement						
recruiting						
volunteers						

25 April 1974

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CENTER FOR NAVAL ANALYSES

RESEARCH CONTRIBUTION 235

Institute of Naval Studies

NAVY RECRUITING IN AN
ALL-VOLUNTEER ENVIRONMENT

July 1973

Christopher Jehn
Hugh E. Carroll II, LCdr., U.S.N.

This Research Contribution does not necessarily represent
the opinion of the Department of the Navy

ABSTRACT

In FY 1972, non-prior service accessions to USN fell below stated requirements. The causes of the FY 1972 Navy recruiting shortfall are analyzed. Productivity of recruiting resources and alternative recruiting strategies are discussed. Data on the draft lottery from January 1970 to August 1972 is used. Recommendations for policy changes and future research are made.

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SYNOPSIS

This Research Contribution has two purposes: first, to isolate the causes for the Navy Recruiting Command's difficulties in meeting requirements in FY 1972; second to identify the effects of pay, advertising, and recruiters on first-term accessions.

An examination of FY 1972 recruiting data showed that the Navy's recruiting shortfall during this period could be largely attributed to the lag in building up its recruiting force, changes in the recruiting environment, increased quotas and self-imposed increased quality standards.

Analysis of the January 1970–August 1972 data revealed that some severe shortcomings in this data preclude quantifying the specific effects of pay, advertising, and recruiters on attracting accessions. Our analysis does, however, lead to the inference that the required number of recruiters depends heavily on the selection, training, motivation, and management of those recruiters.

The FY 1973 recruiting performance improved substantially over FY 1972. On the basis of this performance, continued support of the recruiting command at roughly current levels, and lower accession requirements for FY 1974 and 1975, the Navy should meet its recruiting goals in those years. This, coupled with the other results of our analysis, suggests experimentation to determine the proper allocation of resources within the Recruiting Command. During the next two years, carefully controlled experiments dealing with incentives for recruiters, reallocation of recruiters, advertising techniques, and enlistment options offer the Navy the opportunity to gain insights which will be helpful in establishing recruiting policies in more demanding years.
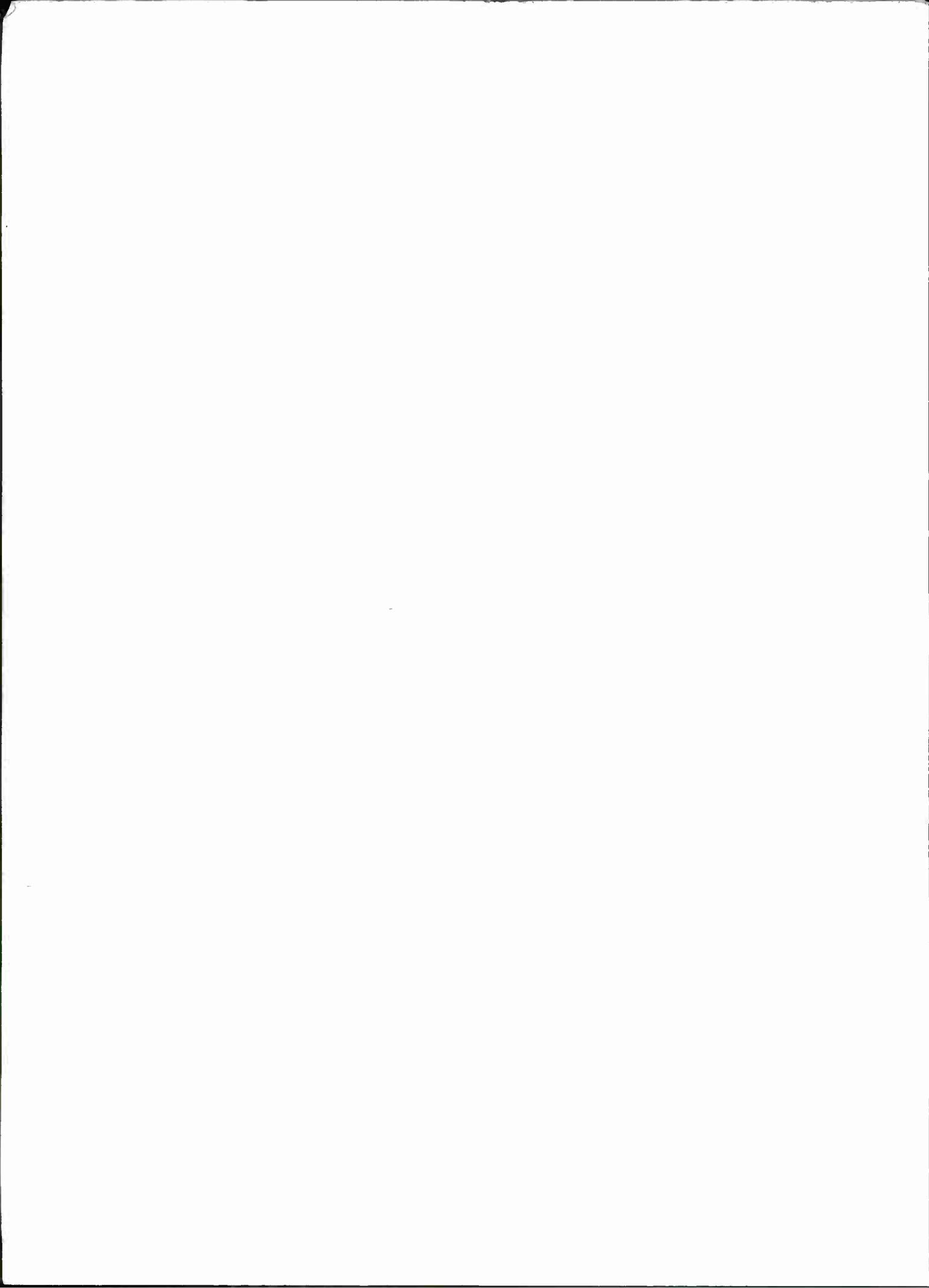
INTRODUCTION

The termination of the military draft in February 1973 has created a new environment for military manpower procurement and with it the potential for severe problems in meeting the services' recruit requirements. From the reintroduction of the draft in FY 1949 through FY 1971, the services had little difficulty meeting their recruit requirements. However, as the transition to an all-volunteer armed force began, draft calls in FY 1972 reached their lowest level since FY 1950. This is illustrated in figure 1 which shows inductions during the post-World War II period.

The Services' reaction to this reduction in draft pressure was an increase in emphasis on recruiting first-term enlistees. Substantial increases in first-term pay and other inducements to enlist were accompanied by increases in both recruiting forces and advertising expenditures.

Despite these efforts, the Navy experienced a significant shortfall in recruit accessions during FY 1972. Figure 2 illustrates the extent of this shortfall by comparing monthly recruiting quotas to actual accessions for FY 1971 and FY 1972.

In the light of the recruiting problems which the Navy faced in FY 1972, we began a study of the Navy's recruiting process. The purpose of this study was twofold: (1) to determine the proximate causes of the Recruiting Command's difficulties in FY 1972; and (2) to discover what policy alternatives exist to cope with any present or future recruiting problems and their relative efficiency in doing so. In particular, we wished to estimate the relative productivity of policy-controlled tools such as increased pay, advertising expenditures, and recruiting forces. The question of recruiter productivity was especially interesting, and we sought to determine not only how many recruiters were necessary but also where they should be stationed.

In what follows, we first address the FY 1972 recruiting performance. We then present results concerning the productivity of various policy alternatives, and a look at recruiting results in FY 1973. Finally, we conclude with a discussion of likely future problems and suggestions for policy changes.
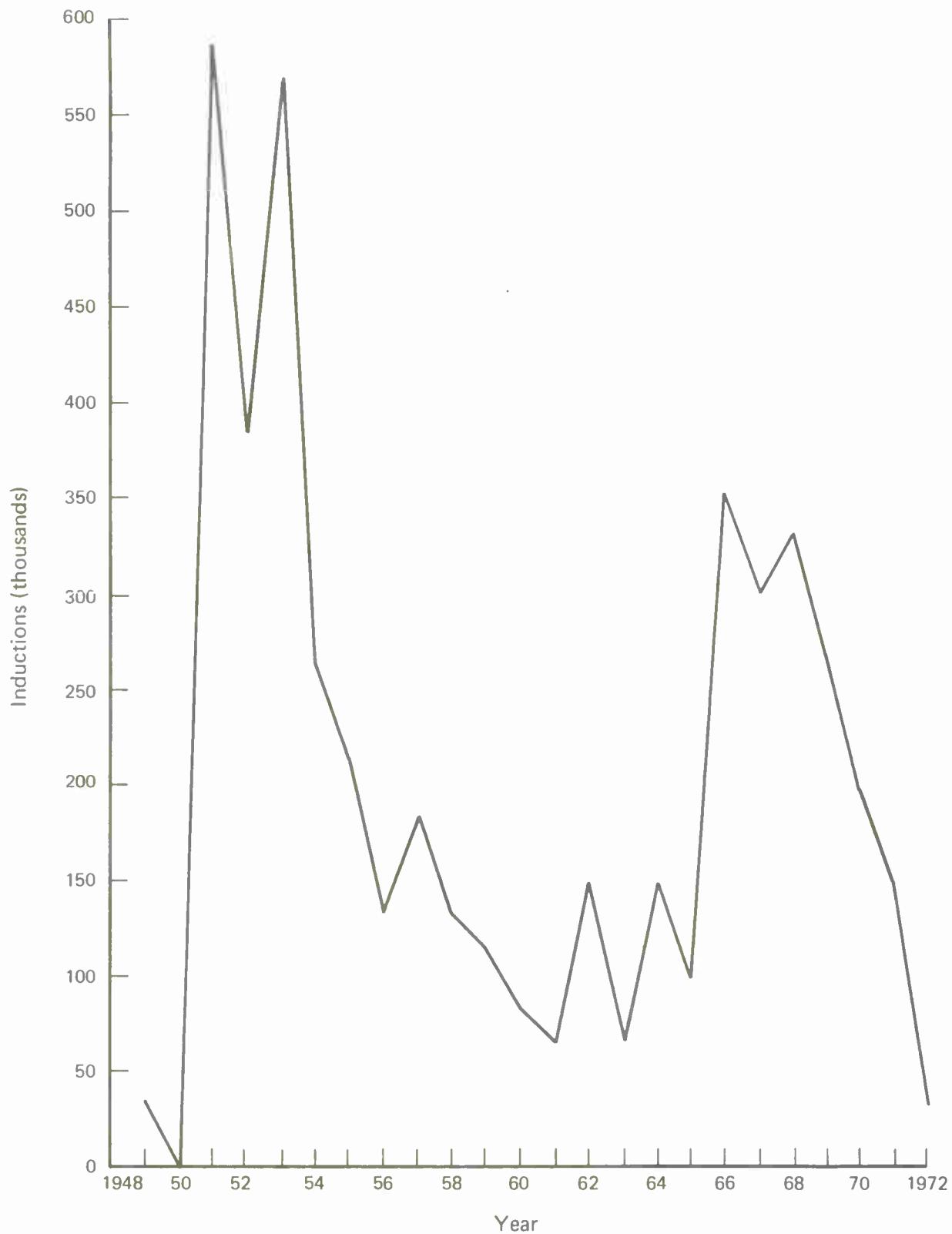
FIG. 1: INDUCTIONS, BY FISCAL YEAR, FY 1949 – 1972

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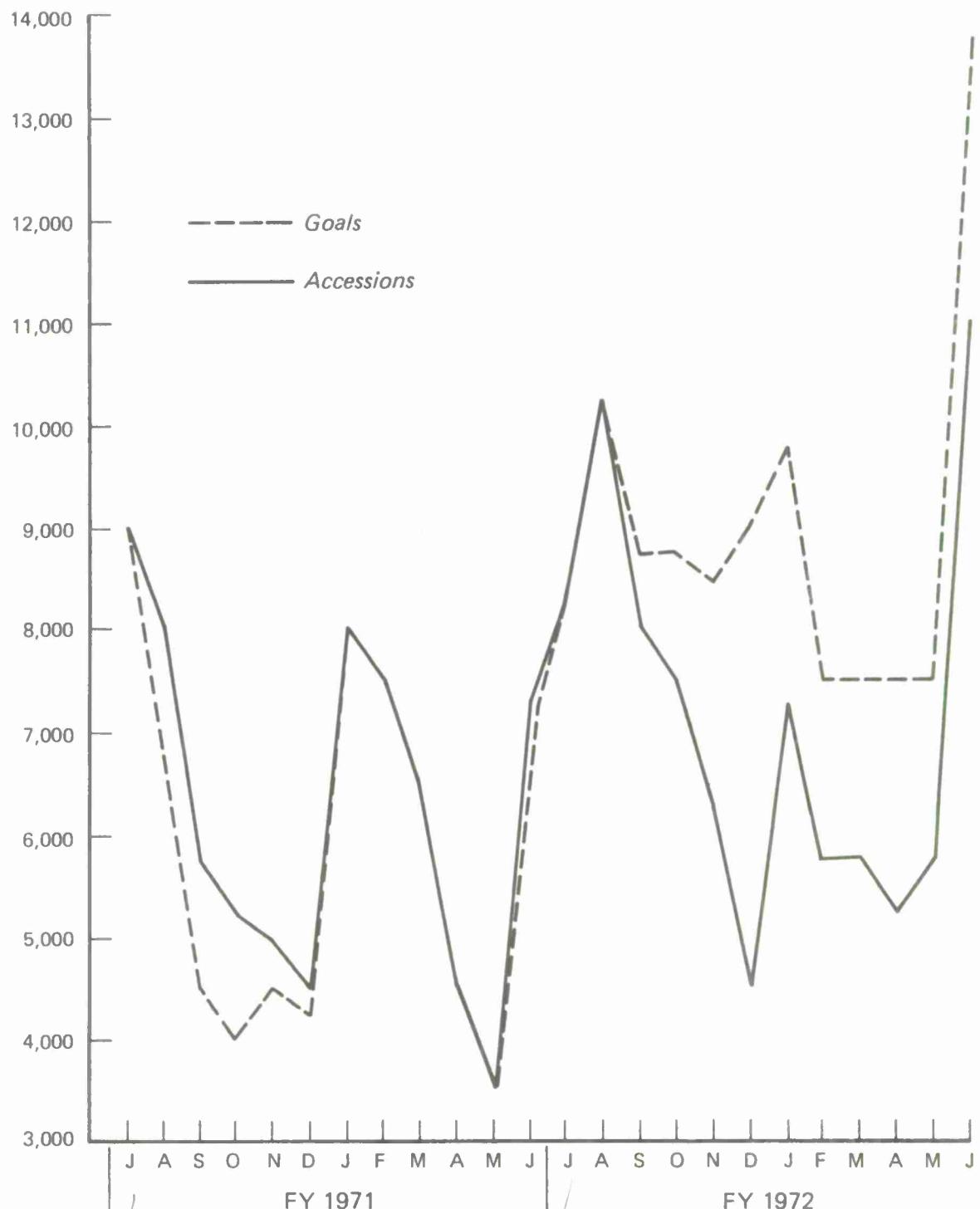
FIG. 2: MONTHLY RECRUITING GOALS AND ACCESSIONS
FY 1971 – FY 1972

July
1970

July 1971

June 1972

3

NAVY RECRUITING IN FY 1972

Figure 2 shows that monthly recruiting goals assigned to the field totaled 107,100 for FY 1972, while actual enlistments totaled only 85,347. In other words, only 79.7 percent of the FY 1972 quota was attained, a shortfall of nearly 22,000. These figures are extremely misleading, however. From October through June 1972, the monthly goals were increased in an attempt to compensate for previous months' shortfalls. Thus, the goal of 107,100 included substantial double counting. In fact, recruitment needs to meet the CNO requirement for an end strength of 524,529 were only 92,872 for FY 1972, rather than 107,100.[1] In other words, 91.9 percent of recruit requirements were attained, not 79.7 percent, and the true shortfall was just over 7,500, not 22,000.

Although meeting 91.9 percent of the FY 1972 recruit requirements represents a much better performance than meeting only 79.7 percent, why wasn't the figure 100 percent, or better, as it was in FY 1971 and earlier years? There are three principal reasons: (1) the quotas (or, more appropriately, requirements) rose over FY 1971; (2) there were significant changes in the recruiting environment which included decreased draft pressure as well as increased attractiveness of the other services; and (3) the Navy adopted more restrictive screening procedures.

As table 1 shows, although quotas were not met, total enlistments were 14 percent higher in FY 1972 than in FY 1971. Thus, had the FY 1972 recruiting goals been the same as those in FY 1971, there would have been no recruiting shortfall.

TABLE 1

NAVY RECRUITING QUOTAS AND ENLISTMENTS, FY 71-72*

	FY 1971	FY 1972	Percent change
Recruiting quotas	71,056	107,100	50.7
Total enlistments	74,118	84,489	14.0
Enlistments by true volunteers	53,415	73,406	37.4
Enlistments by draft-induced volunteers	20,703	11,083	−47.5

*Enlistment data was taken from tapes prepared from U.S. Army Recruiting Command files covering all accessions for all four services. Enlistment figures are slightly lower than actuals due to data losses incurred when reading the tapes. Estimates of true and draft-induced volunteers were based on methodology described in Jehn and Carroll, "Methodology for Using Draft Lottery to Estimate True Volunteers," CNA Research Contribution 247, May 1973.

Table 1 also shows a 37 percent rise in the number of true volunteers entering the Navy in FY 1972, accompanied by a 47 percent fall in the number of draft-induced volunteers. Obviously, then, the fall in draft pressure in FY 1972 (when draft calls were at their lowest since FY 1950)

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[1]NRC (20) memo 5214/la ser 18 of 10 July 1972, enclosure (5).

also contributed significantly to the recruiting shortfalls of that year. However, this decrease in draft-induced volunteers was anticipated, since FY 1972 was widely viewed as the first year of transition to an all-volunteer armed force. Congress enacted a major increase in pay for first-termers during the fall of 1971, and the Navy itself took steps to increase the strength of its recruiting effort.

In April 1971, the recruiting function was removed from the Bureau of Naval Personnel and made a separate field command. This was a move apparently designed to give recruiting greater visibility and strengthen its ability, to command a greater share of the Navy's budget and most capable people. The number of active recruiters in the field was increased from 2339 in July 1971 to 3051 in June 1972. These changes, coupled with the pay raise, were not enough to prevent the Navy's recruiting shortfall in the face of other factors working against the Navy's recruiting effort in FY 1972.

While the Navy's recruiter force increased by 30 percent during FY 1972, the Army's increased by 71 percent, the Air Force's by 36 percent, and the Marine Corps' by 18 percent. (Canvasser forces, by month, for FY 1971-72 are presented in figure 3.) Further, in all cases the increases in the other Services occurred earlier than the Navy's. Given that it probably takes at least several months for a recruiter to become fully productive, the Navy may not have realized the full effects of its increased recruiter force until the end of FY 1972.

In addition to an earlier buildup of recruiter forces, the other Services were more aggressive in their recruiting efforts during FY 1972 than was the Navy. This was particularly true of the Army. The Army's policy of guaranteeing job and location with enlistment, which began with combat units only in February 1971, was significantly liberalized throughout FY 1972. By June 1972, guarantees were available for almost all jobs and locations in the Army. With the advent of these guarantees, many individual Army units began recruiting efforts of their own. In addition, between February and November 1971, the probability of an enlistee being sent to Vietnam fell from 40 percent to 10 percent. These changes made the Army much more attractive, relative to the Navy. then had previously been the case.

Finally, the Navy itself contributed significantly to its recruiting problems in 1972. In late 1971, the Navy tightened its screening of "low quality" individuals which resulted in a probable loss of about 7000 recruits during FY 1972.[1] This figure represents over 93 percent of the true shortfall of 7525 for FY 1972.

The Navy's response to the difficulties of FY 1972 has been promising. There have been a number of significant changes in policy and procedure during FY 1973, many of which were initiated during FY 1972. Among these is the improved selection and training of recruiters, the introduction and expansion of school and location guarantees for enlistees, and the introduction of a three-year enlistment option. However, more improvements are possible, and we elaborate further on these and other possible policy changes in the concluding section of this Research Contribution.

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[1]Detail on the derivation of this estimate can be found in "An Analysis of Navy Recruiting Performance, FY 1972," C. Jehn, Center for Naval Analyses, (INS)1230-72, 15 August 1972.
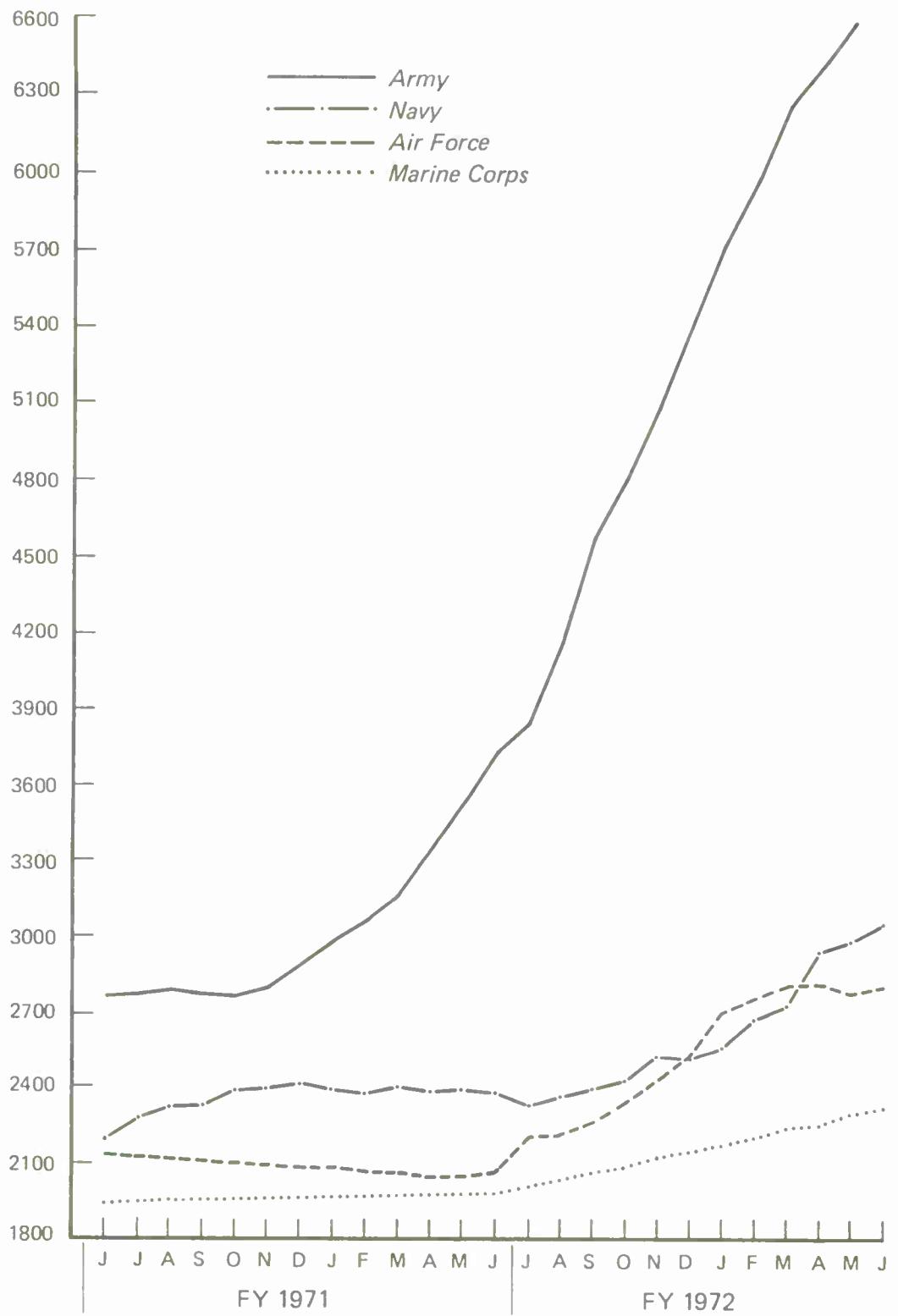
FIG. 3: MONTHLY CANVASSER FORCES, ALL SERVICES
FY 1971 — FY 1972

PRODUCTIVITY OF RECRUITING RESOURCES

ANALYSIS

The previous discussion of the Navy's recruiting performance during FY 1972 leads to the following question. What amount and distribution of resources will be necessary for the post-FY 1973 period when the draft will no longer provide assistance to recruiting? The answer to this question depends on the answers to another set of questions, namely, what are the separate effects on enlistments of various policy tools such as greater pay, more recruiters, and more advertising? While we do not fully answer these latter questions in the analysis that follows, we do present results which make us reasonably confident in the discussion of policy recommendations presented in the concluding section of this Research Contribution.

Time Series Data

We began by estimating how the supply of Navy enlistments depends on pay, unemployment, and policy variables such as the number of recruiters and advertising expenditures. The supply variable was monthly enlistments by true volunteers in mental groups I, II, and upper III for the period January 1970 through August 1972. Several functional forms were tried and all generated similar results. (Several representative regressions, data sources, and a more complete discussion of the problems discussed below are presented in the appendix.) The measured effect of pay, advertising, and recruiting on enlistments was generally *statistically* insignificant. On the other hand, in all cases the effect of recruiters was so high as to strain credulity.

These disappointing results are due to several shortcomings in the data and the estimation technique. First, the three variables whose effects we were most interested in measuring, pay, number of recruiters, and advertising expenditures, are highly correlated with each other. During the period studied, January 1970 to August 1972, there were large increases in military pay, numbers of recruiters for all four Services, and advertising expenditures, and the regression technique cannot tell us to which of these independent variables increases in enlistments should be attributed.

Second, since we wish to estimate a supply function, it is imperative that the observed values of the dependent variable (enlistments) lie *on* the supply function. Unfortunately, there is little guarantee that this is always the case. During much of the time period studied, the Services were meeting recruit quotas with little or no difficulty, which suggests that an excess supply of volunteers existed during this period. If so, what we have used are observations which lie *off* the supply function. While we used techniques designed to minimize this difficulty we are not convinced that these techniques are wholly satisfactory.

In addition to these two general problems, the data for two of the independent variables have significant defects. First, we were able to obtain advertising expenditures by fiscal year only. Thus we have only four data points for advertising, not 32 as for the other variables. Second, the regression technique is based on the assumption that the effect of any explanatory variable is constant over the time period studied. In the case of recruiters this is almost surely *not* a valid

assumption. As the Services moved toward an all-volunteer armed force, the average productivity, in terms of true volunteers, of individual recruiters almost certainly increased. This increase in be attributed to increases in the number of recruiters in the regression. Thus the measured effect of the number of recruiters will very likely be an overestimate.

These problems, then, preclude drawing any useful conclusions from analysis of the time series data. In the next section we present results based on what we believe is a more fruitful approach. Before concluding, however, we should note that the problems we encountered will necessarily be common to any time series study of enlistments during this period. Thus, studies of this sort should be viewed with a great deal of skepticism.

Pooled Cross-Section and Time-Series Data

Given the drawbacks to analysis of time series data, we took a second approach which pooled time-series observations and cross-section observations. We chose first a time period during which virtually no Navy recruiting area made its quotas, October 1971 through June 1972. This was designed to insure that the observations on enlistments did, in fact, lie on the supply curve. For each of these nine months we had observations on enlistments, unemployment, and the number of recruiters for each of the eight Navy recruiting areas. (Data of this form, cross-section observations across time, is sometimes referred to as panel data.) We then estimated a number of versions of the following equation:

$$\ln\left(\frac{E}{P}\right)_{ij} = a + a \ln NR_{ij} + b \ln U_{ij} + \sum_{i=1}^{7} c_i A_i + \sum_{j=1}^{8} d_j T_j \tag{1}$$

where E/P is the enlistment rate (enlistments of true volunteers in mental groups I, II, and III U divided by eligible population), NR is the number of Navy recruiters, U is the unemployment rate, and the A_i represent the areas, and the T_j represent the months. (Detail on the definitions of these variables and data sources can be found in the appendix.)

This formulation yields information only about the effects of recruiters and unemployment on the enlistment rate. Any effects of differential relative wages or tastes across areas are captured by the area variables, the A_i, while seasonal effects are captured by the time variables, the T_j. Thus we have sacrificed the possibility of estimating the effects of increases in wages or advertising for the benefits of avoiding the problems discussed earlier.

Table 2 presents results we obtained from estimating various forms of equation (1). Line (1) is the result from estimating equation (1) as written above. During this time period, the number of recruiters per area generally increased. To allow for the possibility that these increased numbers might not be immediately effective we also entered the number of recruiters from one, two, or three months earlier. These results are presented on lines (2), (3), and (4). Line (5) presents the results when the recruiter variable was entered as four separate variables, contemporaneously and preceded one, two, and three months. In all cases the recruiter variable is insignificant at the 10 percent level. Also, when the regressions were run in stepwise fashion, the recruiter variable was always the last to enter and explained less than one percent of the variance in enlistment rates.

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TABLE 2

PANEL DATA REGRESSION RESULTS

	NR	$\hat{a}$*	R^2	F
(1)	NR_j	0.14 (0.27)	0.93	119.2
(2)	NR_{j-1}	0.44 (0.87)	0.93	120.8
(3)	NR_{j-2}	0.39 (0.80)	0.93	120.5
(4)	NR_{j-3}	0.52 (1.17)	0.93	122.2
(5)	NR_j	0.11 (0.19)	0.93	99.7
	NR_{j-1}	0.33 (0.50)		
	NR_{j-2}	-0.28 (-0.35)		
	NR_{j-3}	0.63 (0.92)		

*Figures in parentheses are t-statistics for the $\hat{a}$.

This last point can be illustrated more dramatically by considering a transformation of equation (1) that removes the area and time effects, the A_i and T_j . (This procedure is explained in detail in the appendix.) The transformed equation is of the form

$$\left(\frac{E}{P}\right)_{ij} = a\,NR_{ij} + b\,U_{ij} \tag{2}$$

where E/P , NR , and U have been transformed but the a and b are the same as in equation (1). The estimated equation is presented below.

$$\frac{E}{P} = \underset{(.30)}{.14\ NR} + \underset{(1.09)}{.21\ U} \tag{3}$$

F-ratio = 0.61 $R^2 = 0.02$

The two explanatory variables are insignificant, as indicated by the t-statistics which are in parentheses, and the equation also is, of course, insignificant.

Both equation (1) and equation (3) were estimated using functional forms other than those illustrated. In addition one other explanatory variable, population density, defined as population per square mile in each recruiting area, was also entered. This variable was designed to capture the possibility that recruiter productivity might be affected by the accessibility of potential recruits.

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Also, $\frac{NR}{P}$ was entered instead of NR. In all these other cases, the results were consistent with those presented above: insignificant coefficients on all the recruiting variables.

These results have led us to conclude that over the range of variation we observed, the number of recruiters has little effect on the enlistment rate. That is not to say, of course, that recruiters don't matter. It does imply that their raw numbers may not matter nearly so much as might characteristics we were unable to measure, such as recruiter selection, training, motivation, and management.

Previous Studies

Our result (that the marginal effect of canvassers is very small) is both contradicted and confirmed by earlier studies which addressed the question of recruiter productivity. In a preliminary paper, Stephan and Horowitz estimated an elasticity of .38 for recruiters (compare this to our estimates of a , the â in table 2).[1] This estimate, however, was not significant at the 10 percent level, a result similar to ours.

In a much more complete paper, Bennett, et al. estimated an elasticity for recruiters of from .53 to .62.[2] The most striking thing about these results, compared to our results, is the fact that they were significant at the 10 percent level, despite the fact that Bennett, et al. had fewer observations than we did. Their estimates for recruiter productivity in the other Services were consistent with these estimates for the Navy. In addition, they also estimated very low (in the Navy's case, negative) relative pay elasticities compared to those of earlier studies. There are a number of errors in the methodology used by Bennett, et al., which cast considerable doubt on the validity of their results, however. Some of these errors, such as incorrect definitions of enlistments, the recruiting variable, and the unemployment variable, produce errors of indeterminate magnitude and direction.

Two other errors in Bennett, et al. however, explain a great deal of the discrepancy between our results and theirs. Their estimates were based on regressions on cross-section data for CY 1970. Their wage variable was unadjusted for price level differences across areas and hence has the probable effect of overstating the wage differences across areas. This in turn has the effect of biasing the estimated relative pay elasticity downward. Further, since CY 1970 was a year of considerable draft pressure, the Services were almost surely faced with an excess supply of potential enlistees. This excess supply of potential enlistees implies that the Services can be more selective and "cream" this excess supply, taking more individuals from the upper mental groups and fewer from the lower mental groups. Since Bennett, et al. used enlistments in mental groups I, II, and III as their dependent variable, this "creaming" process would be reflected in movements of their dependent variable. Recruiters, of course, both facilitate this creaming process and are the means by which creaming occurs. Thus, including a recruiter variable in supply estimates for periods in which excess supply exists will very likely produce estimates of recruiter elasticity which are biased

[1] R.A. Stephan and S.A. Horowitz, "Recruiting Quotas and Distribution of Canvassers," Center for Naval Analyses, (INS)526-72, April 1972.

[2] J.T. Bennett, S.E. Haber, and P.J. Kim, "The Supply of Volunteers to the Armed Forces Revisited," The George Washington University Institute for Management Science and Engineering, Program in Logistics (Serial T-260), March 1972.

upwards. As we argue in the appendix, restricting the dependent variable to true volunteers in the upper mental groups (as Bennett, *et al.* have done) will generally be insufficient to prevent this problem.

In short, there are significant defects in the paper by Bennett, *et al.* which suggest that their results should be viewed with skepticism. Among other defects, we believe the estimated relative pay elasticity is an underestimate, while the estimated recruiter elasticity is neither as high nor as significant as they suggest.

Finally, the results of research done by RAC for the Army yielded results consistent with our Navy results.[1] We cannot discuss their results at any length since their cited paper contains very little detail on either their methodology or results. However, the results they do present show little effect on either total Army enlistments or enlistments in the combat arms as a result of an increase in the size of the recruiting force.

FY 1973 Performance

Table 3 compares the Recruiting Command's performance in FY 1973 to that of FY 1972. These figures are for total enlistments rather than true volunteers, which would have been a more interesting comparison. Nevertheless, the figures in table 3 are encouraging. While nearly 16 percent more recruits have been attained in FY 1973 compared to FY 1972, there has been no diminution of quality in terms of mental group. The only discouraging note is the comparison of the FY 1973 goal of 99,370 to the actual accessions of 91,690, a shortfall of 7,680. However, virtually no recruits from MG IV were accepted during the second half of FY 1973. Had the Navy been willing to accept as many as 20 percent MG IV recruits during all of FY 1973, most of this shortfall would have been eliminated.

TABLE 3

RECRUITING RESULTS, FY 1972 AND FY 1973

	FY 72*		FY 73**		Percent
	Number	Percent of total	Number	Percent of total	change, FY 72-73
MG I & II	31,493	36.9	32,934	35.9	+ 4.6
MG III	36,614	42.9	44,469	48.5	+21.5
MG IV	17,240	20.2	14,287	15.6	−17.1
Total	85,347	100.0	91,690	100.0	+ 7.4
High school graduates	64,437	75.5	63,429	69.2	− 1.6

*Source: NRC (20) memo 5214/la ser 18 of 10 July 1972, enclosure (5).
**Source: Monthly Report, U.S. Navy Recruiting Command, 30 June 1973.

[1]Research Analysis Corporation (RAC), "Project VOLUNTEER: An Analysis of Navy Enlistments to Measure the Impact of the All-Volunteer Program and Provide Trends and Projections," Unsolicited Proposal, August 1972.

The figures in table 3 also suggest that the Recruiting Command should meet accession requirements in FY 1974 and 1975. Recruit requirements in the next two years are currently expected to be less than 80,000 per year. This is the number of recruits achieved in just the first ten months of FY 1973, and compares favorably with the number of recruits for all of FY 1973 in MG I, II, and III (77,403). Further, the Navy recruited more than 82,000 true volunteers in all of FY 1973.

Another interesting comparison is presented in tables 4 and 5. These tables compare the recruit quality mix of FY 1972 and FY 1973 to selected earlier years. They show that while there has been a lessening in the quality of recruits since the peak of the Vietnam war, FY 1973 quality is only slightly lower than in the pre-Vietnam years.

TABLE 4

FIRST-TERM ENLISTMENTS BY MENTAL GROUP, FY 1973 AND SELECTED EARLIER YEARS

	MG I & II	MG III	MG IV
FY 1960-65	40%	50%	10%
FY 1966-69	54	33	13
FY 1972	37	43	20
FY 1973	36	48	16

TABLE 5

PERCENTAGE OF HIGH SCHOOL GRADUATES AMONG FIRST-TERM ENLISTMENTS, FY 1973 AND SELECTED EARLIER YEARS

FY 1960	54%
FY 1964	58
FY 1968	86
FY 1972	76
FY 1973	69

Given the shortcomings of the results we have presented in this section, as well as the defects in the results of other, similar studies, the Recruiting Command might well use the next two years to experiment with changes in policy. This would serve two purposes. First, experiments could be designed to generate better data for further analysis of the type described above. Second, in cases where formal analysis of this sort is difficult or impossible, experimentation could provide information regarding the effectiveness of different policy alternatives. This suggestion is discussed in greater detail in the next section.

CONCLUSIONS

One of the purposes of this study was the evaluation of the relative effectiveness of policy devices such as increased pay, more advertising, and a larger recruiting force. Given the available data, this proved to be a more difficult task than expected. Although the results we presented in the preceding section are not in themselves particularly revealing, they do offer insights which permit us to translate them into a set of recommendations and suggestions.

Pay

Consider first the question of the effectiveness of pay increases. We have discovered no ~or any other~ evidence which would lead us to doubt the accuracy of previous estimates of pay elasticity such as those prepared for the Gates Commission.[1] Although our estimates were generally somewhat lower, the differences that exist are largely due to different definitions or formulations of the wage variable. (This point is discussed at length in the appendix.)

Advertising

The results of the analysis do not lead to any conclusions about the effectiveness of advertising. Until the use of advertising agencies began in the spring of 1972, the Navy collected no data on placements of paid advertisements. The case of free advertising is similar in that again little or no record is kept of the amount of free advertising the Navy receives. This is due primarily to the process by which free advertising is solicited and received. The Navy prepares advertisements which are distributed by the Navy or individual recruiters to the media. The individual advertisements are then placed at the discretion of the stations or newspapers and no report is made to the Navy as to the frequency with which the ad is used, if at all.

With the advent of the Navy's paid advertising campaign, it will be possible to better assess the effectiveness of advertising. The advertising agency keeps a close record of purchased advertising space or time and this data, which we lacked, will greatly facilitate analysis.

When this analysis is done, however, the Navy should insure that the proper questions are asked. Advertising agencies tend to speak in terms of numbers of coupons clipped out of magazines, postcards returned, or phone calls received as a measure of effectiveness of advertising. While this kind of information may be useful for measuring the relative reach or impact of specific ads or media, it is *not* the sort of information the Navy should look to for evaluating the effectiveness of an entire advertising campaign. After all, the potential recruit who returns a postcard, for example, may have come in contact with a recruiter some other way had there been no advertising. The appropriate question for the Navy to ask can be phrased at least two ways. Other things equal, how many more recruits does the advertising campaign bring into the Navy, or, to what extent does advertising make the recruiter's job easier? These questions may be easier to

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[1]See H. J. Gilman, "Supply of Volunteers to the Military Services," in *Studies Prepared for the President's Commission on an All-Volunteer Armed Force,* November 1970, pp. II-1-1 to II-1-26.

answer by experimentation than by after-the-fact formal analysis, and so we raise this issue again below when we discuss some possible policy experiments.

Recruiters

The results in the preceding section have also lead us to conclude that there are no *measurable* effects of increases (or decreases) in the number of recruiters, at the margin. As we said earlier, this does not mean that recruiters are not important. It does imply, though, that the *number* of recruiters is not nearly so important as might be their selection, training, motivation, and management. It also suggests that any significant reallocation of recruiters is likely to have little effect, if no attention is paid to these other factors.

Further, sophisticated analysis, even if it is well done, may not be entirely desirable. It can lead to highly centralized control and may minimize the actual or perceived responsibility of those actually doing the recruiting. Money spent on sophisticated economic analyses might be better spent investigating the recruiting practices of large corporations such as the Bell System or General Motors, and large public organizations such as big city police departments.

RECOMMENDATIONS

Recruiters

The empirical results presented in the previous section also suggest, directly and indirectly, a number of areas where change or improvement in policy would be beneficial. Many of the suggestions or recommendations we make have already been initiated by the Recruiting Command but are not yet fully implemented. The most obvious of these is the selection and training of recruiters. Prior to 1972, when recruiting was a lower priority item, recruiter billets were often used to alleviate the shore rotation problem of the deprived ratings. Recruiters were not carefully screened for motivation or ability. The Bureau of Naval Personnel has apparently assured the Recruiting Command that the selection of recruiters now has the highest priority. This suggests that a great deal of thought should be given to the selection of recruiters. Among questions to be asked in this context are: What are the desirable characteristics of a recruiter? And, what kinds of experience and training should they have? These questions apply not only to the enlisted canvassers but also to the management staff which is composed largely of commissioned officers.

As a move in this direction the Recruiting Command has requested the creation of a new rating for recruiters. While this idea has merit, it should be considered carefully. Two possible problems are immediately obvious. First, no less effort should be given to the selection and training of recruiters than is given to, for example, the selection and training of personnel entering more technical ratings. Nothing could be worse for the Navy than individuals who are unhappy with sea duty or other aspects of normal Navy life opting for a recruiter rating. Second, care must be taken that career recruiters do not lose touch with the "real Navy." One possible solution to this problem is to have recruiters serve as career counselors on sea duty. Although we have not made a detailed examination of this question, it is our impression that career counselors are often as poorly trained for their jobs as recruiters have been in the past. Thus, a single rating covering both recruiters and

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career counselors could improve performance in both jobs as well as keep the recruiter familiar with Navy life.

Recruiting Policy

In addition to better selection, training, and placement of recruiters, there are a number of relatively minor policy changes which might result in increases in recruiter productivity. For example, the recruiter's principal function is convincing young men and women that joining the Navy is a wise decision. Any other functions he performs must necessarily lessen the amount of time he can devote to this prime task. Given this fact, the Recruiting Command should ask itself whether it is unnecessarily burdening the actual recruiter with other chores. For example, can some of the paperwork the recruiter now does be handled more efficiently by support staff, or elsewhere, such as at the Recruit Training Centers? Are the frequent policy changes regarding school-eligible requirements, cut scores, and cache policies accomplishing enough to warrant the confusion they produce among recruiters? It is really necessary for the recruiter to account for each tenth of a mile of vehicle use?

The latter question concerning vehicle use suggests another possible improvement in policy. Assignment of marked vehicles to individual recruiters for personal as well as business use might increase costs only slightly while improving the mobility and visibility of the recruiter. This policy has apparently been used quite successfully by some police departments with their patrol cars and is something we feel is worth further investigation by the Navy.

Enlistment Guarantees

While we have argued against burdening the recruiter with unnecessary paperwork, one policy which probably adds to this burden, guaranteeing job, school. or location, should be expanded as much as possible. Guarantees are undoubtedly an attractive enlistment feature and their widespread use ought to greatly facilitate recruiting. These advantages to recruiting will have to be weighed against the problems expanded guarantees might create in terms of placement or school scheduling.

Policy Experimentation

Given the questionable data which exists regarding the relative effectiveness of policy variables and the costs associated with erroneous decisions, the Navy has the obligation to carefully evaluate new programs prior to their implementation. Inasmuch as the Recruiting Command was able to come very close to meeting its recruiting goals in FY 1973 and the goals for 1974 and 1975 will be substantially below those of 1973, the Recruiting Command should meet these goals given continued support of the Recruiting Command at roughly current levels. Thus, the next two years provide an excellent opportunity for experimenting with new policies without the fear that it will hinder the recruiting effort. Some of the suggestions we have made above might first be tried on an experimental basis but there are other candidates for experimentation as well.

The incentive system for recruiters might well be manipulated experimentally. Currently, recruiters (or recruiting stations) are given goals but few formal rewards except for the top eight or so recruiters in the country. The incentive system for one recruiting area, for example, could be changed to allow payment of increased proficiency pay to the most successful recruiters (or some less monetary award such as a paid trip to a resort or some R&R center). The performance of recruiters in this area could then be compared to both their earlier performance as well as the performance of recruiters in other areas. Care must be taken to prevent damaging competition between recruiters at the same station in the design of such an experiment. For this reason, the awards might be given to stations rather than individual recruiters. The Navy must also be alert to "cheating" by recruiters of the sort experienced recently in the Army Recruiting Command. Increased monetary rewards will certainly increase incentives for cheating.

Different advertising techniques are also candidates for experimentation. By advertising only in selected areas (rather than nationwide as is the current practice), a better notion of the effectiveness of advertising could be gained.

Reallocation of recruiters among recruiting areas or districts might also be done experimentally. Until now, the reason for reallocating recruiters was to maximize the number of recruits, given some number of recruiters. Other reasons for reallocation might include a desire to increase the number of women or minority group members.

Finally, the Navy should probably experiment with enlistment options of different lengths including open-ended contracts during the next two years. A major rationale for requiring first-term service of some specified length is the desire to amortize training costs. The military services are the only employers who require a fixed commitment of their recruits before training is given, however. Police and fire departments, employers who also do a great deal of pre-job-experience training, seem to manage without the long-term commitment the services require. The Navy might find it can more easily attract individuals if they are not required to commit three or four years of their life to finding out what the Navy is like. For example, recruits who do not want A-school training might be allowed to enlist with an option to leave the Navy *any* time after recruit training has been completed. This option might be confined to one recruiting area at first, until both the ease of recruiting and attrition rates have been evaluated.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

The analysis presented above leads to the following conclusions:

(1) Most of the Navy recruiting shortfall in FY 72 can be explained by increased quality screens.

(2) Had the Navy been willing to accept as many MG IV recruits in FY 73 as they did in FY 72 (20 percent of total accessions) there would have been little recruiting shortfall in FY 73.

(3) The Navy should meet presently planned quantitative (or qualitative) recruit requirements for FY 74 and 75, assuming continued support of the Recruiting Command at roughly current levels.

(4) The required number of recruiters depends heavily on the selection, training, motivation, and management of those recruiters.

This analysis in turn leads us to make the following recommendations, many of which have already been initiated by the Recruiting Command:

(1) Continued careful consideration should be given to the desirable characteristics of recruiters and their selection and training.

(2) A joint "recruiter/career counselor" rating should be considered.

(3) Minimize paperwork assigned to recruiters.

(4) Consider assigning marked vehicles to recruiters on a personal basis.

(5) Expand use of enlistment guarantees.

(6) Use FY 74 and 75 for experimentation to;
   a) develop recruiter incentives based on productivity of individual recruiters or stations;
   b) determine the effectiveness of advertising;
   c) determine optimal allocation of recruiters across recruiting areas or districts;
   d) determine the effectiveness (and problems) of enlistment contracts of varying lengths, including an open ended enlistment contract.

APPENDIX A

DESCRIPTION OF DATA AND EQUATIONS

APPENDIX A

DESCRIPTION OF DATA AND EQUATIONS

This appendix provides additional discussion of the data, statistical techniques, and results presented in the text.

TIME SERIES DATA

The time-series analysis discussed in the text was based on regressions derived from the general form

$$\frac{E}{P} = f(W, U, NA, OA, NR, OR, \text{Time Effects})$$ (A-1)

where

$\frac{E}{P}$ = enlistment rate,

W = relative wages,

NA = Navy advertising,

OA = other Services advertising,

NR = Navy recruiters,

OR = other services recruiters, and

"Time Effects" refer to dummy variables for seasonal effects or other time-specific factors not captured by the other independent variables.

The variables were derived as follows.

E – Enlistments

Enlistments in the Navy were defined as "true volunteers" accessions in mental groups I, II, and upper III. True volunteers were defined as 2.9 times the number of recruits holding lottery numbers 241 and above (365 ÷ 125 = 2.9) plus 100 percent of the recruits holding no lottery numbers. The rationale for this definition of true volunteers can be found in Jehn and Carroll, "Methodology for Using Draft Lottery Data to Estimate True Volunteers," CNA RC 247, May 1973.

The data itself was taken from tapes prepared from U.S. Army Recruiting Command files for all DoD accessions from January 1970 forward. This accession data lists recruits by their active duty base date, rather than the date they signed their enlistment contracts.

P – Population

Population was defined as 17-20 year-old noninstitutionalized civilian males. The data was obtained from unpublished population estimates of the U.S. Bureau of Census which are consistent with "Current Population Reports," Series P-25, Nos. 483 and 490, and estimates of the institutional population consistent with the 1970 census.

W – Relative Wages

Relative wages was defined as the ratio of discounted expected military earnings to discounted expected civilian earnings over a four-year period. Expected military earnings was compiled as military pay weighted by the distribution of Navy enlisted men by pay grade through the first four years of service. Expected civilian earnings was based on the usual weekly earnings of 17-20 year-old civilian males in the full-time labor force as of May 1969, 1970, and 1971, from unpublished "Current Population Survey" tabulations. Interpolations and extrapolations for other months were based on changes in weekly manufacturing earnings from U.S. Bureau of Labor Statistics, "Employment and Earnings." Unlike earlier, similar work such as that done for the Gates Commission, we did not adjust civilian earnings for the likelihood of less than full-time year-around employment. This has the probable effect of lowering our estimates of wage elasticity and raising our estimates of unemployment elasticity relative to this earlier work.

U – Unemployment

Unemployment was defined as the unemployment rate for 17-20 year-old civilian males with major activity other than school. The data was taken from the "Current Population Survey" monthly tabulations, table 7 (unpublished).

NA, OA – Navy Advertising and Other Services Advertising

Advertising was defined as the annual dollar rate of advertising expenditure. This was the same for all months of a given fiscal year since monthly expenditures was not available. Thus, there were four observations for OA and NA (FY 1970, 1971, 1972, and 1973) rather than 32 available for all other variables. All data was obtained from the Central All-Volunteer Armed Force Task Force (OASD/M&RA).

NR, OR – Navy Recuiter and Other Services Recruiters

Recruiters was defined as the number of enlisted canvassers on duty. All data was obtained from the personnel departments of the respective services' recruiting commands.

TIME-SERIES REGRESSIONS

A representative regression based on equation (A-1) is presented below.

$$\ln\left(\frac{E}{P}\right) = 21.6 + \underset{(.41)}{.82} \ln W - \underset{(-2.00)}{11.8} \ln (1\text{-}U) - \underset{(-.47)}{.16} \ln NA$$

$$+ \underset{(.80)}{1.53} \ln NR - \underset{(-1.36)}{.64} \text{ S-DUM} + \underset{(3.50)}{1.82} \text{ T-DUM I}$$

$$+ \underset{(5.23)}{1.72} \text{ T-DUM II} + \underset{(.91)}{.28} \text{ T-DUM III} \qquad\qquad (A\text{-}2)$$

$R^2 = .84$ Durbin-Watson Statistic = 1.43   F-ratio = 12.49

In equation (A-2) S-DUM takes the value of 1 during February, March, and April 1972, when the Navy was using a screen based on the Odds-for-Effectiveness table, and takes the value of 0 for all other months. T-DUM I, T-DUM II, and T-DUM III are seasonal dummy variables representing, respectively, January; June, July, and August; and September, October, and November. The figures in parentheses are t-statistics. Since the estimation was done in log-linear form, the coefficients associated with the independent variables (other than the dummies) are also elasticities. That is, the coefficient of any independent variables equals e , where

$$e = \frac{\text{Percent change in E/P}}{\text{Percent change in the independent variable}} .$$

Thus the regression results imply, for example, that a 10 percent increase in relative wages will elicit an 8.2 percent increase in the enlistment rate, or a 10 percent increase in recruiters will increase the enlistment rate 15.3 percent.

As we discussed in the text, because of some severe shortcomings in both the data and the regression technique, it would be a mistake to make much of the results in equation (A-2). Some of these defects have been noted in the text. We discuss these and other problems in greater detail below.

Note first that only three explanatory variables in (A-2) are significant at the 5 percent level (T-DUM I, T-DUM II, and U) while the three variables we are most interested in, W, NA, and NR, all have insignificant coefficients. This latter result is due, at least in part, to a high correlation among W, NA, and NR. This phenomenon, known as multicollinearity, leads to both imprecise estimates and high variance of the coefficients on the collinear variables.

Turning to the estimated equation itself, we see first that the coefficients on W and U have the intuitively correct sign, and do not conflict greatly with estimates obtained in previous studies.[1]

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[1]See, for example, the papers by Gray and Fechter in *Studies Prepared for the President's Commission on an All-Volunteer Armed Force*, November 1970.

The discrepancy that does exist is probably largely due to the definitions we used for W and U, which differ somewhat from these earlier studies.

The coefficient on NA, however, has the "wrong" sign. The negative sign implies that a rise in advertising expenditures will decrease the enlistment rate. It would be a mistake to make very much of this result, though. Not only is NA collinear with two other variables, W and NR, but, as noted in the text, the advertising variable itself is seriously flawed. Further, no information is available as to the amount of *free* advertising the Navy received during this period.

At first glance the coefficient on NR seems high. It implies a 10 percent increase in the recruiter force leads to a 15.3 percent increase in the enlistment rate. Here too, caution is advisable in interpreting this result. In addition to the problem of multi-collinearity discussed earlier, probably a more serious problem revolves around the implicit assumption of the regression technique, that the effect of any explanatory variable is constant over the time period in question. This is almost surely *not* a valid assumption in the case of recruiters. For the first 18 months or so of the period we studied (i.e., January 1970 to June 1971), recruiters had little difficulty meeting quotas. With the move towards an all-volunteer Navy, greater attention has been paid to both the training and allocation of recruiters. The effect of this is that the efficiency or productivity of individual recruiters increased over the last 14 months of the period studied (i.e., July 1971 to August 1972). This was a period, however, when the Navy substantially increased the size of its recruiting force. An increase in average recruiter productivity, coupled with the increase in the number of recruiters, would have the effect of overstating the marginal effect of recruiters in the regression. Thus the estimated elasticity of 1.53 for recruiters is almost surely an overestimate.

The regression technique introduces another difficulty in interpreting equation (A-2). As we discussed in the text, if the results of a supply curve estimate are to be taken seriously, there must be some assurance that the observations used for such estimation lie on the supply curve. In this instance that is probably not the case. In periods of high draft pressure, or, more generally anytime recruiters are meeting or exceeding quotas (which was true during much of the time period we studied), there is no assurance that the number of enlistments observed is the total that would be forthcoming were the services not constrained by requirements. Using only enlistments in the upper mental groups is a technique for circumventing this problem, the assumption being that at least true volunteers in the upper mental groups will not be turned away in favor of draft-induced volunteers. However, since the appearance of volunteers before recruiters is a stochastic process, recruiters cannot be relied upon to turn individuals in the lower mental groups away in the expectation that volunteers in the upper mental groups will subsequently show up in sufficient numbers to meet quotas. Thus, some true volunteers in the upper mental groups will be turned away in any given month. Of course some of these individuals may be cached for accession in subsequent months rather than simply turned away. If so, this is an argument for wanting enlistment date data. Unfortunately, the enlistment data we used was by active duty base date. To the best of our knowledge, data on enlistments by enlistment date is unavailable.

Finally, we should note that equation (A-2) is only one of a number of similar regressions which were fitted using the time series data. Other functional forms were also fitted and two other independent variables, OA and OR were entered. In addition, different definitions of the independent variables were used such as entering $\frac{NR}{P}$ and $\frac{OR}{P}$ for NR and OR . All results were

consistent with those discussed above. Insignificant coefficients on the wage, advertising, and recruiting variables was the rule, while in most cases the coefficient on the number of recruiters was so high as to strain credulity. Further, to capture the possibility that the effects of changes in the independent variables are not immediately felt, some regressions were run using a variety of lag structures.

Equation (A-2) itself was estimated in distributed lag form. We postulate that there is some equilibrium enlistment rate in period t, $\left(\frac{E}{P}\right)^*$, associated with given values of the independent variables. Then equation (A-2) can be written

$$\ln\left(\frac{E}{P}\right)^*_t = a_1 + \sum_{i=2}^{n} a_i X_{it} + e_t \quad , \tag{A-3}$$

where the X_{it} are the logarithms of the independent variables and e_t is an error term. If changes in the independent variables (the X_i) have instantaneous effect on $\frac{E}{P}$, then the equilibrium enlistment rate and the observed enlistment rate will have the same value, or

$$\ln\left(\frac{E}{P}\right)_t = \ln\left(\frac{E}{P}\right)^*_t$$

or

$$\ln\left(\frac{E}{P}\right)_t - \ln\left(\frac{E}{P}\right)_{t-1} = \ln\left(\frac{E}{P}\right)^*_t - \ln\left(\frac{E}{P}\right)_{t-1} \quad ,$$

If, however, adjustment to the equilibrium enlistment rate is not instantaneous, then only some fraction, b, of the effect of changes in the enlistment rate will be felt immediately. This can be written

$$\ln\left(\frac{E}{P}\right)_t - \ln\left(\frac{E}{P}\right)_{t-1} = b\left[\ln\left(\frac{E}{P}\right)^*_t - \ln\left(\frac{E}{P}\right)_{t-1}\right] \quad , \tag{A-4}$$

with $0 < b < 1$. Rearranging (A-4) gives

$$\ln\left(\frac{E}{P}\right)^*_t = \frac{1}{b}\left[\ln\left(\frac{E}{P}\right)_t - (1 - b)\ln\left(\frac{E}{P}\right)_{t-1}\right] \quad . \tag{A-5}$$

Substituting (A-5) into (A-3) gives

$$\ln\left(\frac{E}{P}\right)_t = ba_1 + \sum_{i=2}^{n} ba_i X_{it} + (1-b)\ln\left(\frac{E}{P}\right)_{t-1} + e_t \quad . \tag{A-6}$$

Thus, *as estimated*, equation (A-2) reads

$$\ln\left(\frac{E}{P}\right)_t = c_1 + c_2 \ln W + c_3 \ln U + c_4 \ln NA + c_5 \ln NR + c_6 \text{ S-DUM}$$

$$+ c_7 \text{ T-DUM I} + c_8 \text{ T-DUM II} + c_9 \text{ T-DUM III} + c_{10} \ln\left(\frac{E}{P}\right)_{t-1}$$

$$+ e_t \quad . \tag{A-7}$$

We see from (A-7) that $c_{10} = 1\text{-}b$ or $b = 1\text{-}c_{10}$ so the a_i in (A-2) are defined as

$$a_i = \frac{c_i}{1 - c_{10}} \quad .$$

The a_i are the "steady-state" coefficients and are those displayed in equation (A-2).

One drawback to using this distributed lag form is that it constrains all the independent variables to have the same lagged effect on the enlistment rate. In all likelihood, however, these lags may differ for different independent variables. Equations with other lag structures were estimated for this reason. Again, results did not differ significantly from those of equation (A-2).

POOLEO CROSS-SECTION AND TIME-SERIES REGRESSION

The results presented in table 2 and equation (3) are based on data taken from the same sources as the time-series data and other sources. The variables e and NR were defined the same and derived from the same sources as the time-series data. The regional population estimates necessary for estimating equation (1) were obtained from "Handbook, Military Available Inventory, FY 72-73," U.S. Army Recruiting Command Pamphlet 601-1. Military availables are defined as 17-21 year-old civilian males, with the raw data taken from U.S. Census sources. The regional unemployment statistics were derived from unpublished U.S. Bureau of Labor Statistics compilations of work force, unemployment, and unemployment rate, by state.

As discussed in the text, equation (1) was estimated specifically for the purpose of gaining additional insight into the marginal productivity of active recruiters. The results presented in table 2 show little significance attached to the coefficients on recruiters. This fact is more dramatically illustrated in equation (3), the estimated version of equation (2). Equation (2) was derived as follows.

First we rewrite equation (1):

$$\left(\frac{E}{P}\right)_{ij} = aNR_{ij} + bU_{ij} + c_i + d_j \tag{A-8}$$

where $\frac{E}{P}$, NR, and U are still in logarithmic form but we have deleted "$\ln$" for simplicity. The c_i and d_j are the area and time effects, respectively. Then we can write the mean across areas as

$$\left(\frac{\overline{E}}{P}\right)_{.j} = a\overline{NR}_{.j} + b\overline{U}_{.j} + \overline{c}_{.} + d_j \qquad (A\text{-}9)$$

where the mean is denoted by the bar over the variable and a "." replacing the subscript over which the mean was taken. Similarly we have the mean over time and the grand mean:

$$\left(\frac{\overline{E}}{P}\right)_{i.} = a\overline{NR}_{i.} + b\overline{U}_{i.} + c_i + \overline{d}_{.} \quad , \qquad (A\text{-}10)$$

$$\left(\frac{\overline{E}}{P}\right)_{..} = a\overline{NR}_{..} + b\overline{U}_{..} + \overline{c}_{.} + \overline{d}_{.} \quad . \qquad (A\text{-}11)$$

If we subtract equations (A-9) and (A-10) from equation (A-8) and add equation (A-11) to the result, the terms c and d drop out and we are left with

$$\left[\left(\frac{E}{P}\right)_{ij} - \left(\frac{\overline{E}}{P}\right)_{.j} - \left(\frac{\overline{E}}{P}\right)_{i.} + \left(\frac{\overline{E}}{P}\right)_{..} \right] =$$

$$a\left(NR_{ij} - \overline{NR}_{.j} - \overline{NR}_{i.} + \overline{NR}_{..}\right) + b\left(U_{ij} - \overline{U}_{.j} - \overline{U}_{i.} + \overline{U}_{..}\right). \qquad (A\text{-}12)$$

Equation (A-12) can be rewritten

$$\left(\frac{E}{P}\right)_{ij} = aNR_{ij} + bU_{ij} \qquad (A\text{-}13)$$

where $\frac{E}{P}$, NR, and U have been transformed as in equation (A-12). Equation (A-13) is, of course, simply equation (2), which we estimated. The results of this estimation are presented as equation (3).

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